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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,237	07/29/2003	Francis J. DiSalvo JR.	C1134.70003US00	8278

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EXAMINER	
LEWIS, BEN	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/22/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/630,237	DISALVO ET AL.	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7,13 and 91-96* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,13 and 91-96* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/10/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. The Applicant's amendment filed on October 10th, 2006 was received. Claim 1 was amended. Claims 2-6, 8-12 and 14-90 were cancelled. Claims 91-96 were added.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (issued on June 30th, 2006).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 94-96 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 94-96 recites the limitation "the fuel cell" in claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Lukehart et al. (U.S. Patent No. 6,232,264 B1).

With respect to claims 1, 7, 92 and 93, Lukehart et al disclose polymetallic precursors wherein the invention includes a fuel cell catalyst composition which comprises a supported nanocomposite (Col 6 lines 65-67). The nanoparticles in the nanocomposite of the present invention are preferably substantially formed of, and more preferably virtually solely formed of the crystalline alloy "ordered" form of the first metal and the second metal. By way of example, such crystalline alloy forms would include PtRu, PtSn, Pt_2W, Pt_3Sn, Pt_3Ru, Pt_3Mo, RuMo, mixtures of various of these forms with PtP_2, and various other stoichiometric combinations of core metals of the precursors described herein (Col 20 lines 25-35).

Lukehart et al teach that such carbon-supported nanoparticles, particularly platinum and platinum-rich alloy nanoparticles, such as platinum-ruthenium, are useful fuel cell catalysts. Catalysts that have been studied include PtRu, Pt_3Ru, and PtPb. These catalysts have also been investigated for use as anode catalysts in fuel cells (Col 4 lines 20-30).

Lukehart et al teach that the composition may be formed into an electrode, such as an anode or cathode, for use in a fuel cell such as a DMFC by standard methods using standard ink electrode technology. When methanol is added to the fuel cell and contacts the electrode in the presence of oxygen, the oxidation of methanol is catalyzed by the nanoparticles and electrons extracted from methanol can be passed through the conductive connection of the particles to the support, and through the support to an external circuit, whereby direct current may be generated (Col 20 lines 25-35).

With respect to claim 13, Lukehart et al teach that the nanoparticles in the nanocomposite of the present invention are preferably substantially formed of, and more preferably virtually solely formed of the crystalline alloy "ordered" form of the first metal and the second metal. By way of example, such crystalline alloy forms would include PtRu, PtSn, Pt_2W, Pt_3Sn, Pt_3Ru, Pt_3Mo, RuMo, mixtures of various of these forms with PtP_2, and various other stoichiometric combinations of core metals of the precursors described herein (Col 20 lines 25-35). Lukehart et al also teach that the first metal is preferably a noble metal such as platinum, palladium, gold, or any other transition metal or Lanthanide metal. The at least one second metal may be any of the metals acceptable for the at least one first metal including metals from Groups 13-16, like tin. (Col 4 lines 20-30)

The instant specification recites: The invention provides a catalyst that comprises an ordered intermetallic compound and is designed for use in a catalytic system. In some embodiments, the catalyst may comprise an ordered platinum intermetallic compound, such as BiPt, Bi_2Pt, PtIn, PtPb, PtGe, $PtIn_2$, $PtIn_3$, Pt_3In_7, PtSn, $PtSn_2$, Pt_3Sn, t_2Sn_3, $PtSn_4$, PtSb, $PtSb_2$, PtGa, $PtCd_2$, and PtMn. In some embodiments, the catalyst may comprise an ordered palladium intermetallic compound (Paragraph 0011).

Lukehart et al et al do not specifically teach wherein the ordered intermetallic compound has an interatomic nearest neighbor distances of greater than at least 3.0 Angstroms along at least one axis. However, it is the position of the examiner that such properties are inherent, given that Lukehart et al and the present application utilize the same elements which are both made in a crystalline "ordered" form. A reference which

is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claim 91, Lukehart et al. teach that metal/carbon nanocomposites of commercial importance were prepared in less than one minute of reaction time by microwave irradiation of conductive carbon powder supported metallic or polymetallic precursors. Pd or Pt halide complexes were used as precursors for nanoparticles comprising those metals, while a non-cluster-type Pt--Ru bimetallic precursor was used as a single-source precursor to generate nanoparticles "powder" having the composition Pt_1 Ru_1. Average metal particle sizes for these Pd, Pt, and Pt_1 Ru_1 nanoparticles were 7.0, 5.3, and 2.8 nm, respectively by TEM (Col 32 lines 25-41).

Claim Rejections - 35 USC § 103

7. Claims 94 and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lukehart et al. (U.S. Patent No. 6,232,264 B1) as applied to claim 1 above and further in view of Acker et al. (U.S. Patent No. 2002/0102451A1).

With respect to claims 94 and 96, Lukehart et al disclose polymetallic precursors wherein the invention includes a fuel cell catalyst composition which comprises a

supported nanocomposite in paragraph 2 above. Lukehart et al do not specifically teach wherein the fuel is ethanol or ethylene glycol. However, Acker et al. disclose a fuel cell wherein the anode catalyst layer 42 includes high surface area catalytic alloy particles, such as platinum particles (Pt) or a mixture of platinum and ruthenium alloy particles (Pt/Ru). The electrocatalytic particles are loaded onto either the anode gas diffusion layer 44 or the membrane electrolyte 80 to act as an electrocatalyst. The Pt/Ru alloy particles are well known in the art and provided either as "unsupported" particles in the form of a fine metal powder, or "supported" particles. The "supported" particles include electrocatalyst particles dispersed on high surface area particles (Paragraph 0051). Acker et al. also teach that methanol may be supplied to the fuel cell system 10 as a vapor or a direct feed liquid stream of either neat methanol or a solution of methanol and water. Other hydrocarbon fuels may be used with the fuel cell system 10 of the invention, such as, although not limited to, ethanol, ethylene glycol, supplied to the fuel cell system 10 in either vapor or liquid state (Paragraph 0047). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use ethanol and ethylene glycol of Acker et al. in the fuel cell of Lukehart et al. because it would be economically and operationally beneficial to use different fuels to generate electricity.

8. Claim 95 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lukehart et al. (U.S. Patent No. 6,232,264 B1) as applied to claim 1 above and further in view of Qi et al. (U.S. Patent No. 7,141,322 B2).

With respect to claims 95, Lukehart et al disclose polymetallic precursors wherein the invention includes a fuel cell catalyst composition which comprises a supported nanocomposite in paragraph 2 above. Lukehart et al do not specifically teach wherein the fuel is formic acid. However, Qi et al. disclose a fuel cell wherein Pt/Ru and Pt blacks were used as the anode and cathode catalysts, and they were applied to Teflon.RTM.-treated 6- and 9-mil Toray paper, respectively, in order to achieve electrodes with Pt/Ru and Pt (Col 4 lines 44-55). Qi et al. also teach that for fuel cells comprising a formic acid and methanol/water solution for the conduction of protons within the anode structure, formic acid appeared to improve ionic conductivity and was clean burning. Furthermore, it did not poison the catalysts (Col 2 lines 10-20). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the formic acid fuel of Qi et al. into the fuel cell of Lukehart et al. because Qi et al. teach that formic acid appeared to improve ionic conductivity and was clean burning. Furthermore, it did not poison the catalysts (Col 2 lines 10-20).

Response to Arguments

9. Applicant's arguments filed on October 10th, 2006have been fully considered but they are not persuasive.

Applicant's principal arguments are

(a) Applicant has amended independent claim 1 to recite that the ordered intermetallic compound is PtPb and that the catalyst oxidizes a fuel selected from the group consisting of formic acid, methanol, ethanol and ethylene glycol. Lukehart fails to teach or suggest a catalyst comprising ordered intermetallic PtPb which oxidizes any of the fuels recited in amended claim 1.

In response to Applicant's arguments, please consider the following comments.

(a) Lukehart et al teach that the composition may be formed into an electrode, such as an anode or cathode, for use in a fuel cell such as a DMFC by standard methods using standard ink electrode technology. When methanol is added to the fuel cell and contacts the electrode in the presence of oxygen, the oxidation of methanol is catalyzed by the nanoparticles and electrons extracted from methanol can be passed through the conductive connection of the particles to the support, and through the support to an external circuit, whereby direct current may be generated (Col 20 lines 25-35).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER